



#3

SEQUENCE LISTING

<110> Hong Jin et al.

<120> Recombinant RSV Expression Systems and
Vaccines

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<140> 09/923,070

<141> 2001-08-06

<150> 09/161,122

<151> 1998-09-25

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 35 40 45
 Ile Ser Arg Gln Asn Pro Leu Ile Glu His Met Asn Leu Lys Lys Leu
 50 55 60
 Asn Ile Thr Gln Ser Leu Ile Ser Lys Tyr His Lys Gly Glu Ile Lys
 65 70 75 80
 Leu Glu Glu Pro Thr Tyr Phe Gln Ser Leu Leu Met Thr Tyr Lys Ser
 85 90 95
 Met Thr Ser Ser Glu Gln Ile Ala Thr Asn Leu Leu Lys Lys Ile
 100 105 110
 Ile Arg Arg Ala Ile Glu Ile Ser Asp Val Lys Val Tyr Ala Ile Leu
 115 120 125

Asn	Lys	Leu	Gly	Leu	Lys	Glu	Lys	Asp	Lys	Ile	Lys	Ser	Asn	Asn	Gly
130						135					140				
Gln	Asp	Glu	Asp	Asn	Ser	Val	Ile	Thr	Thr	Ile	Ile	Lys	Asp	Asp	Ile
145					150					155					160
Leu	Ser	Ala	Val	Lys	Asp	Asn	Gln	Ser	His	Leu	Lys	Ala	Asp	Lys	Asn
				165					170					175	
His	Ser	Thr	Lys	Gln	Lys	Asp	Thr	Ile	Lys	Thr	Thr	Leu	Leu	Lys	Lys
			180					185				190			
Leu	Met	Cys	Ser	Met	Gln	His	Pro	Pro	Ser	Trp	Leu	Ile	His	Trp	Phe
	195					200					205				
Asn	Leu	Tyr	Thr	Lys	Leu	Asn	Asn	Ile	Leu	Thr	Gln	Tyr	Arg	Ser	Asn
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Glu	Val	Lys	Asn	His	Gly	Phe	Thr	Leu	Ile	Asp	Asn	Gln	Thr	Leu	Ser
225				230						235					240
Gly	Phe	Gln	Phe	Ile	Leu	Asn	Gln	Tyr	Gly	Cys	Ile	Val	Tyr	His	Lys
			245						250					255	
Glu	Leu	Lys	Arg	Ile	Thr	Val	Thr	Thr	Tyr	Asn	Gln	Phe	Leu	Thr	Trp
			260					265					270		
Lys	Asp	Ile	Ser	Leu	Ser	Arg	Leu	Asn	Val	Cys	Leu	Ile	Thr	Trp	Ile
	275					280					285				
Ser	Asn	Cys	Leu	Asn	Thr	Leu	Asn	Lys	Ser	Leu	Gly	Leu	Arg	Cys	Gly
	290					295					300				
Phe	Asn	Asn	Val	Ile	Leu	Thr	Gln	Leu	Phe	Leu	Tyr	Gly	Asp	Cys	Ile
305				310						315					320
Leu	Lys	Leu	Phe	His	Asn	Glu	Gly	Phe	Tyr	Ile	Ile	Lys	Glu	Val	Glu
			325						330					335	
Gly	Phe	Ile	Met	Ser	Leu	Ile	Leu	Asn	Ile	Thr	Glu	Glu	Asp	Gln	Phe
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Arg	Lys	Arg	Phe	Tyr	Asn	Ser	Met	Leu	Asn	Asn	Ile	Thr	Asp	Ala	Ala
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Asn	Lys	Ala	Gln	Lys	Asn	Leu	Ser	Arg	Val	Cys	His	Thr	Leu	Leu	
370					375					380					
Asp	Lys	Thr	Val	Ser	Asp	Asn	Ile	Ile	Asn	Gly	Arg	Trp	Ile	Ile	Leu
385				390						395					400
Leu	Ser	Lys	Phe	Leu	Lys	Leu	Ile	Lys	Leu	Ala	Gly	Asp	Asn	Asn	Leu
			405						410					415	
Asn	Asn	Leu	Ser	Glu	Leu	Tyr	Phe	Leu	Phe	Arg	Ile	Phe	Gly	His	Pro
		420						425					430		
Met	Val	Asp	Glu	Arg	Gln	Ala	Met	Asp	Ala	Val	Lys	Ile	Asn	Cys	Asn
	435					440						445			
Glu	Thr	Lys	Phe	Tyr	Leu	Leu	Ser	Ser	Leu	Ser	Met	Leu	Arg	Gly	Ala
	450					455					460				
Phe	Ile	Tyr	Arg	Ile	Ile	Lys	Gly	Phe	Val	Asn	Asn	Tyr	Asn	Arg	Trp
465				470						475					480
Pro	Thr	Leu	Arg	Asn	Ala	Ile	Val	Leu	Pro	Leu	Arg	Trp	Leu	Thr	Tyr
			485						490					495	
Tyr	Lys	Leu	Asn	Thr	Tyr	Pro	Ser	Leu	Leu	Glu	Leu	Thr	Glu	Arg	Asp
		500						505					510		
Leu	Ile	Val	Leu	Ser	Gly	Leu	Arg	Phe	Tyr	Arg	Glu	Phe	Arg	Leu	Pro
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Lys	Lys	Val	Asp	Leu	Glu	Met	Ile	Ile	Asn	Asp	Lys	Ala	Ile	Ser	Pro
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Pro	Lys	Asn	Leu	Ile	Trp	Thr	Ser	Phe	Pro	Arg	Asn	Tyr	Met	Pro	Ser
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His	Ile	Gln	Asn	Tyr	Ile	Glu	His	Glu	Lys	Leu	Lys	Phe	Ser	Glu	Ser
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Asp	Lys	Ser	Arg	Arg	Val	Leu	Glu	Tyr	Tyr	Leu	Arg	Asp	Asn	Lys	Phe
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8

Leu Met Arg Asp Pro Gln Ala Leu Gly Ser Glu Arg Gln Ala Lys Ile
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 Thr Ser Glu Ile Asn Arg Leu Ala Val Thr Glu Val Leu Ser Thr Ala
 1075 1080 1085
 Pro Asn Lys Ile Phe Ser Lys Ser Ala Gln His Tyr Thr Thr Thr Glu
 1090 1095 1100
 Ile Asp Leu Asn Asp Ile Met Gln Asn Ile Glu Pro Thr Tyr Pro His
 1105 1110 1115 1120
 Gly Leu Arg Val Val Tyr Glu Ser Leu Pro Phe Tyr Lys Ala Glu Lys
 1125 1130 1135
 Ile Val Asn Leu Ile Ser Gly Thr Lys Ser Ile Thr Asn Ile Leu Glu
 1140 1145 1150
 Lys Thr Ser Ala Ile Asp Leu Thr Asp Ile Asp Arg Ala Thr Glu Met
 1155 1160 1165
 Met Arg Lys Asn Ile Thr Leu Leu Ile Arg Ile Leu Pro Leu Asp Cys
 1170 1175 1180
 Asn Arg Asp Lys Arg Glu Ile Leu Ser Met Glu Asn Leu Ser Ile Thr
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 Glu Leu Ser Lys Tyr Val Arg Glu Arg Ser Trp Ser Leu Ser Asn Ile
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 Val Gly Val Thr Ser Pro Ser Ile Met Tyr Thr Met Asp Ile Lys Tyr
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 Thr Thr Ser Thr Ile Ser Ser Gly Ile Ile Ile Glu Lys Tyr Asn Val
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 Ser Ser Thr Gln Glu Lys Lys Thr Met Pro Val Tyr Asn Arg Gln Val
 1265 1270 1275 1280
 Leu Thr Lys Lys Gln Arg Asp Gln Ile Asp Leu Leu Ala Lys Leu Asp
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 Trp Val Tyr Ala Ser Ile Asp Asn Lys Asp Glu Phe Met Glu Glu Leu
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 Ser Ile Gly Thr Leu Gly Leu Thr Tyr Glu Lys Ala Lys Lys Leu Phe
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 Pro Gln Tyr Leu Ser Val Asn Tyr Leu His Arg Leu Thr Val Ser Ser
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 Arg Pro Cys Glu Phe Pro Ala Ser Ile Pro Ala Tyr Arg Thr Thr Asn
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 Tyr His Phe Asp Thr Ser Pro Ile Asn Arg Ile Leu Thr Glu Lys Tyr
 1365 1370 1375
 Gly Asp Glu Asp Ile Asp Ile Val Phe Gln Asn Cys Ile Ser Phe Gly
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 Leu Ser Leu Met Ser Val Val Glu Gln Phe Thr Asn Val Cys Pro Asn
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 Arg Ile Ile Leu Ile Pro Lys Leu Asn Glu Ile His Leu Met Lys Pro
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 Pro Ile Phe Thr Gly Asp Val Asp Ile His Lys Leu Lys Gln Val Ile
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 Gln Lys Gln His Met Phe Leu Pro Asp Lys Ile Ser Leu Thr Gln Tyr
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 Val Glu Leu Phe Leu Ser Asn Lys Thr Leu Lys Ser Gly Ser His Val
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 Asn Ser Asn Leu Ile Leu Ala His Lys Ile Ser Asp Tyr Phe His Asn
 1475 1480 1485
 Thr Tyr Ile Leu Ser Thr Asn Leu Ala Gly His Trp Ile Leu Ile Ile
 1490 1495 1500
 Gln Leu Met Lys Asp Ser Lys Gly Ile Phe Glu Lys Asp Trp Gly Glu
 1505 1510 1515 1520

Gly Tyr Ile Thr Asp His Met Phe Ile Asn Leu Lys Val Phe Phe Asn
 1525 1530 1535
 Ala Tyr Lys Thr Tyr Leu Leu Cys Phe His Lys Gly Tyr Gly Lys Ala
 1540 1545 1550
 Lys Leu Glu Cys Asp Met Asn Thr Ser Asp Leu Leu Cys Val Leu Glu
 1555 1560 1565
 Leu Ile Asp Ser Ser Tyr Trp Lys Ser Met Ser Lys Val Phe Leu Glu
 1570 1575 1580
 Gln Lys Val Ile Lys Tyr Ile Leu Ser Gln Asp Ala Ser Leu His Arg
 1585 1590 1595 1600
 Val Lys Gly Cys His Ser Phe Lys Leu Trp Phe Leu Lys Arg Leu Asn
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 Val Ala Glu Phe Thr Val Cys Pro Trp Val Val Asn Ile Asp Tyr His
 1620 1625 1630
 Pro Thr His Met Lys Ala Ile Leu Thr Tyr Ile Asp Leu Val Arg Met
 1635 1640 1645
 Gly Leu Ile Asn Ile Asp Arg Ile His Ile Lys Asn Lys His Lys Phe
 1650 1655 1660
 Asn Asp Glu Phe Tyr Thr Ser Asn Leu Phe Tyr Ile Asn Tyr Asn Phe
 1665 1670 1675 1680
 Ser Asp Asn Thr His Leu Leu Thr Lys His Ile Arg Ile Ala Asn Ser
 1685 1690 1695
 Glu Leu Glu Asn Asn Tyr Asn Lys Leu Tyr His Pro Thr Pro Glu Thr
 1700 1705 1710
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 1715 1720 1725
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 Asn Tyr Ser Lys Gln Asp Leu Tyr Asn Leu Phe Pro Met Val Val Ile
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 Asp Arg Ile Ile Asp His Ser Gly Asn Thr Ala Lys Ser Asn Gln Leu
 1780 1785 1790
 Tyr Thr Thr Thr Ser His Gln Ile Ser Leu Val His Asn Ser Thr Ser
 1795 1800 1805
 Leu Tyr Cys Met Leu Pro Trp His His Ile Asn Arg Phe Asn Phe Val
 1810 1815 1820
 Phe Ser Ser Thr Gly Cys Lys Ile Ser Ile Glu Tyr Ile Leu Lys Asp
 1825 1830 1835 1840
 Leu Lys Ile Lys Asp Pro Asn Cys Ile Ala Phe Ile Gly Glu Gly Ala
 1845 1850 1855
 Gly Asn Leu Leu Leu Arg Thr Val Val Glu Leu His Pro Asp Ile Arg
 1860 1865 1870
 Tyr Ile Tyr Arg Ser Leu Lys Asp Cys Asn Asp His Ser Leu Pro Ile
 1875 1880 1885
 Glu Phe Leu Arg Leu Tyr Asn Gly His Ile Asn Ile Asp Tyr Gly Glu
 1890 1895 1900
 Asn Leu Thr Ile Pro Ala Thr Asp Ala Thr Asn Asn Ile His Trp Ser
 1905 1910 1915 1920
 Tyr Leu His Ile Lys Phe Ala Glu Pro Ile Ser Leu Phe Val Cys Asp
 1925 1930 1935
 Ala Glu Leu Ser Val Thr Val Asn Trp Ser Lys Ile Ile Ile Glu Trp
 1940 1945 1950
 Ser Lys His Val Arg Lys Cys Lys Tyr Cys Ser Ser Val Asn Lys Cys
 1955 1960 1965
 Met Leu Ile Val Lys Tyr His Ala Gln Asp Asp Ile Asp Phe Lys Leu
 1970 1975 1980

Asp Asn Ile Thr Ile Leu Lys Thr Tyr Val Cys Leu Gly Ser Lys Leu
 1985 1990 1995 2000
 Lys Gly Ser Glu Val Tyr Leu Val Leu Thr Ile Gly Pro Ala Asn Ile
 2005 2010 2015
 Phe Pro Val Phe Asn Val Val Gln Asn Ala Lys Leu Ile Leu Ser Arg
 2020 2025 2030
 Thr Lys Asn Phe Ile Met Pro Lys Lys Ala Asp Lys Glu Ser Ile Asp
 2035 2040 2045
 Ala Asn Ile Lys Ser Leu Ile Pro Phe Leu Cys Tyr Pro Ile Thr Lys
 2050 2055 2060
 Lys Gly Ile Asn Thr Ala Leu Ser Lys Leu Lys Ser Val Val Ser Gly
 2065 2070 2075 2080
 Asp Ile Leu Ser Tyr Ser Ile Ala Gly Arg Asn Glu Val Phe Ser Asn
 2085 2090 2095
 Lys Leu Ile Asn His Lys His Met Asn Ile Leu Lys Trp Phe Asn His
 2100 2105 2110
 Val Leu Asn Phe Arg Ser Thr Glu Leu Asn Tyr Asn His Leu Tyr Met
 2115 2120 2125
 Val Glu Ser Thr Tyr Pro Tyr Leu Ser Glu Leu Leu Asn Ser Leu Thr
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 35 40 45
 Ile Ser Arg Gln Asn Pro Leu Ile Glu His Met Asn Leu Lys Lys Leu
 50 55 60
 Asn Ile Thr Gln Ser Leu Ile Ser Lys Tyr His Lys Gly Glu Ile Lys
 65 70 75 80
 Leu Glu Glu Pro Thr Tyr Phe Gln Ser Leu Leu Met Thr Tyr Lys Ser
 85 90 95
 Met Thr Ser Ser Glu Gln Ile Ala Thr Thr Asn Leu Leu Lys Lys Ile
 100 105 110
 Ile Arg Arg Ala Ile Glu Ile Ser Asp Val Lys Val Tyr Ala Ile Leu
 115 120 125
 Asn Lys Leu Gly Leu Lys Glu Lys Asp Lys Ile Lys Ser Asn Asn Gly
 130 135 140
 Gln Asp Glu Asp Asn Ser Val Ile Thr Thr Ile Ile Lys Asp Asp Ile
 145 150 155 160
 Leu Ser Ala Val Lys Asp Asn Gln Ser His Leu Lys Ala Asp Lys Asn
 165 170 175
 His Ser Thr Lys Gln Lys Asp Thr Ile Lys Thr Thr Leu Leu Lys Lys
 180 185 190
 Leu Met Cys Ser Met Gln His Pro Pro Ser Trp Leu Ile His Trp Phe
 195 200 205
 Asn Leu Tyr Thr Lys Leu Asn Asn Ile Leu Thr Gln Tyr Arg Ser Asn

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Glu Val Lys Asn His	Gly Phe Thr Leu Ile	Asp Asn Gln Thr Leu Ser		
225	230	235	240	
Gly Phe Gln Phe Ile	Leu Asn Gln Tyr Gly Cys	Ile Val Tyr His Lys		
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Glu Leu Lys Arg Ile	Thr Val Thr Thr Tyr Asn	Gln Phe Leu Thr Trp		
	260	265	270	
Lys Asp Ile Ser Leu	Ser Arg Leu Asn Val Cys	Leu Ile Thr Trp Ile		
	275	280	285	
Ser Asn Cys Leu Asn	Thr Leu Asn Lys Ser Leu	Gly Leu Arg Cys Gly		
	290	295	300	
Phe Asn Asn Val Ile	Leu Thr Gln Leu Phe	Leu Tyr Gly Asp Cys Ile		
305	310	315	320	
Leu Lys Leu Phe His	Asn Glu Gly Phe Tyr	Ile Ile Lys Glu Val Glu		
	325	330	335	
Gly Phe Ile Met Ser	Leu Ile Leu Asn Ile	Thr Glu Glu Asp Gln Phe		
	340	345	350	
Arg Lys Arg Phe Tyr	Asn Ser Met Leu Asn	Asn Ile Thr Asp Ala Ala		
	355	360	365	
Asn Lys Ala Gln Lys	Asn Leu Ser Arg Val	Cys His Thr Leu Leu		
	370	375	380	
Asp Lys Thr Val Ser	Asp Asn Ile Ile Asn	Gly Arg Trp Ile Ile Leu		
385	390	395	400	
Leu Ser Lys Phe Leu	Lys Leu Ile Lys Leu	Ala Gly Asp Asn Asn Leu		
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Asn Asn Leu Ser Glu	Leu Tyr Phe Leu Phe	Arg Ile Phe Gly His Pro		
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Met Val Asp Glu Arg	Gln Ala Met Asp Ala	Val Lys Ile Asn Cys Asn		
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Glu Thr Lys Phe Tyr	Leu Leu Ser Ser Leu	Ser Met Leu Arg Gly Ala		
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Phe Ile Tyr Arg Ile	Ile Lys Gly Phe Val	Asn Asn Tyr Asn Arg Trp		
465	470	475	480	
Pro Thr Leu Arg Asn	Ala Ile Val Leu Pro	Leu Arg Trp Leu Thr Tyr		
	485	490	495	
Tyr Lys Leu Asn Thr	Tyr Pro Ser Leu Leu	Glu Leu Thr Glu Arg Asp		
	500	505	510	
Leu Ile Val Leu Ser	Gly Leu Arg Phe Tyr	Arg Glu Phe Arg Leu Pro		
	515	520	525	
Lys Lys Val Asp Leu	Glu Met Ile Ile Asn	Asp Lys Ala Ile Ser Pro		
	530	535	540	
Pro Lys Asn Leu Ile	Trp Thr Ser Phe Pro	Arg Asn Tyr Met Pro Ser		
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His Ile Gln Asn Tyr	Ile Glu His Glu Lys	Leu Lys Phe Ser Glu Ser		
	565	570	575	
Asp Lys Ser Arg Arg	Val Leu Glu Tyr Tyr	Leu Arg Asp Asn Lys Phe		
	580	585	590	
Asn Glu Cys Asp Leu	Tyr Asn Cys Val Val	Asn Gln Ser Tyr Leu Asn		
	595	600	605	
Asn Pro Asn His Val	Val Ser Leu Thr Gly	Lys Glu Arg Glu Leu Ser		
	610	615	620	
Val Gly Arg Met Phe	Ala Met Gln Pro Gly	Met Phe Arg Gln Val Gln		
625	630	635	640	
Ile Leu Ala Glu Lys	Met Ile Ala Glu Asn	Ile Leu Gln Phe Phe Pro		
	645	650	655	
Glu Ser Leu Thr Arg	Tyr Gly Asp Leu Glu	Leu Gln Lys Ile Leu Glu		
	660	665	670	
Leu Lys Ala Gly Ile	Ser Asn Lys Ser Asn	Arg Tyr Asn Asp Asn Tyr		

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Asp	Glu	Leu	His	Gly	Val	Gln	Ser	Leu	Phe	Ser	Trp	Leu	His	Leu	Thr
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Ile	Pro	His	Val	Thr	Ile	Ile	Cys	Thr	Tyr	Arg	His	Ala	Pro	Pro	Tyr
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Ile	Gly	Asp	His	Ile	Val	Asp	Leu	Asn	Asn	Val	Asp	Glu	Gln	Ser	Gly
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Leu	Tyr	Arg	Tyr	His	Met	Gly	Gly	Ile	Glu	Gly	Trp	Cys	Gln	Lys	Leu
	770					775					780				
Trp	Thr	Ile	Glu	Ala	Ile	Ser	Leu	Leu	Asp	Leu	Ile	Ser	Leu	Lys	Gly
785					790					795					800
Lys	Phe	Ser	Ile	Thr	Ala	Leu	Ile	Asn	Gly	Asp	Asn	Gln	Ser	Ile	Asp
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Ile	Ser	Lys	Pro	Ile	Arg	Leu	Met	Glu	Gly	Gln	Thr	His	Ala	Gln	Ala
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Asp	Tyr	Leu	Leu	Ala	Leu	Asn	Ser	Leu	Lys	Leu	Leu	Tyr	Lys	Glu	Tyr
	835					840					845				
Ala	Gly	Ile	Gly	His	Lys	Leu	Lys	Gly	Thr	Glu	Thr	Tyr	Ile	Ser	Arg
	850					855					860				
Asp	Met	Gln	Phe	Met	Ser	Lys	Thr	Ile	Gln	His	Asn	Gly	Val	Tyr	Tyr
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Pro	Ala	Ser	Ile	Lys	Lys	Val	Leu	Arg	Val	Gly	Pro	Trp	Ile	Asn	Thr
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Ser Ser Thr	Gln Glu Lys Lys Thr Met Pro Val Tyr Asn Arg Gln Val				
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Pro Gln Tyr	Leu Ser Val Asn Tyr Leu His Arg Leu Thr Val Ser Ser				
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Arg Pro Cys	Glu Phe Pro Ala Ser Ile Pro Ala Tyr Arg Thr Thr Asn				
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Tyr His Phe	Asp Thr Ser Pro Ile Asn Arg Ile Leu Thr Glu Lys Tyr				
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Leu Ser Leu	Met Ser Val Val Glu Gln Phe Thr Asn Val Cys Pro Asn				
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